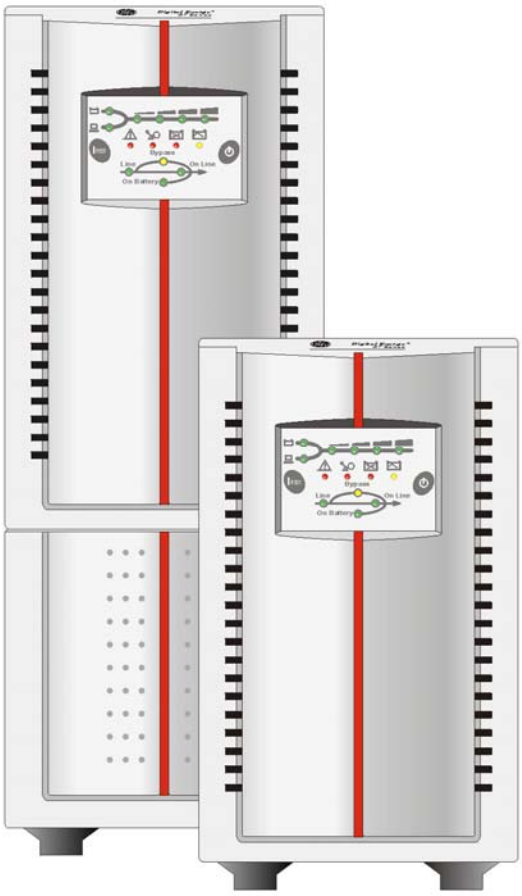
User manual

ACE Plus Series

Uninterruptible Power Supply
1000-1500-2000-3000 VA
UL-version



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SQS
ISO 9001 / EN 29001
Reg. No. 10448

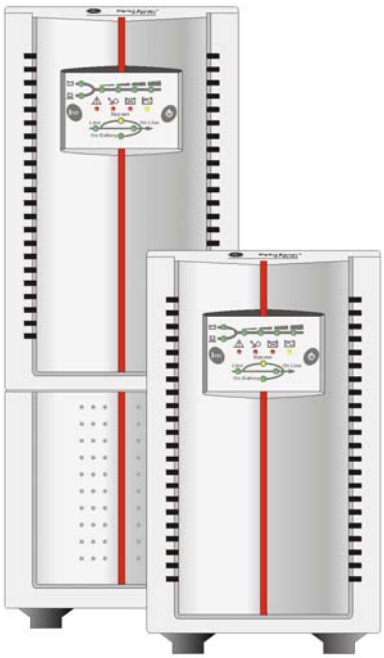
USER MANUAL

ACE Plus Series

Uninterruptible Power Supply
1000 – 1500 - 2000 - 3000 VA
UL-version

The ***POWERVAR ACE Plus Series*** is an uninterruptible power supply, which protects your equipment from all forms of power problems, including complete power failures.

Please keep this manual in a safe place for future reference and carefully read the important safety instructions in chapter 1 before installation and start-up of the UPS.



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1 - Important Safety Instructions

1.1 Save these instructions

This manual contains important instructions for the ***ACE Plus Series*** UPS system that should be followed during installation and maintenance of the UPS and the batteries.

Before attempting to install and start up the UPS, carefully read this manual. Keep this manual next to the UPS for future references. All servicing must be done by qualified personnel. Do not attempt to service the UPS unless you have had proper training.

WARNING: By opening or removing covers you run the risk of exposure to dangerous voltages!

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1.2 General

- **CAUTION: RISK OF ELECTRIC SHOCK.**
- The UPS has an internal battery supply, with a nominal voltage of (UPS rating / voltage): 1kVA / 36Vdc, 1.5kVA / 72Vdc, 2kVA / 72Vdc, 3kVA / 72Vdc.
- The appliance outlets may be electrically live, even when the UPS is disconnected from the utility supply. Dangerous voltages may be present during battery operation.
- Do not open the unit; there are no user serviceable parts inside.
- The batteries must be disconnected during maintenance or service work.
- The UPS contains potentially hazardous voltages.

1.3 Installation

- The unit should be installed by service personnel.
- To reduce the risk of electric shock, install this UPS in a temperature and humidity controlled indoor area free of conductive contaminants.
- Ambient temperature must not exceed 40°C (104°F). Optimal battery lifetime is obtained if the ambient temperature does not exceed 30°C (86°F).
- It is important that the unit has adequate ventilation. Maintain air movement around and through the unit. Do not block the air vents.
- Avoid placing the unit in direct sunlight or near heat sources.
- The UPS should only be powered from a 2-pole 3-wire grounded wall outlet. This outlet must be easily accessible and located near the UPS.
- Do not use extension cords when connecting the UPS to the utility power supply.
- The AC output of the UPS needs a disconnecting switch such as a breaker which has to be provided by others.
- The over current protection for the output AC circuit has to be provided by others. All of our UPS have an electronic protection of AC output short circuit.
- Avoid spilling liquids on or dropping any foreign object into the UPS.
- Do not plug a laser printer or household appliances such as electric heaters or vacuum cleaners into the UPS. The UPS output is intended to be used only for electronic loads such as computers and telecommunications equipment.
- Upon installation, it should be ensured that the sum of the leakage currents of the UPS and the connected loads does not exceed 3.5mA.
- The unit should be operated by properly trained personnel.

1.4 Batteries

- **NOTE**: Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.
- When replacing the batteries, use only the same number, type and size battery: GP1270-F2 (CSB) or NP7-12(YUASA) or HR1234W F2 (CSB).
- Avoid charging in a sealed container.

- **CAUTION:** Never dispose of batteries in a fire. The batteries may explode.
- **CAUTION:** Do not open or mutilate batteries. Released electrolyte is harmful to the skin and eyes. It may be toxic. If exposed to electrolyte, wash immediately with plenty of water.

- **CAUTION:** A battery can present a risk of electrical shock and high short circuit current. The following precautions should be observed when working on batteries:
  - Remove watches, rings or other metal objects.
  - Use tools with insulated handles.
  - Wear rubber gloves and boots.
  - Do not lay tools or metal parts on top of batteries.
  - Disconnect charging source prior to connecting or disconnecting battery terminals.
  - Determine if the battery is inadvertently grounded. If inadvertently grounded, remove source of ground. Contact with any part of a grounded battery can result in electrical shock. The likelihood of such shock will be reduced if such grounds are removed during installation and maintenance (applicable to UPS and external battery supply not having a grounded supply circuit).

- Proper disposal or recycling of the batteries is required. Refer to your local codes for disposal requirements.

1.5 Transport/storage

- No liability can be accepted for any transport damage when the equipment is shipped in non-original packaging.
- Store the UPS in a dry location with the batteries in a fully charged state. Storage temperature must be within -20 and +45 °C (-4°F and 113°F). If the unit is stored for a period exceeding 3 months, optimal battery lifetime is obtained if the storage temperature does not exceed 25°C (77°F).
- If the unit is stored for an extended period of time, the batteries must be recharged periodically. Connect the unit to a working wall outlet and recharge the batteries for 24 hours:
  - Storage temperature within -20 and +30°C (-4°F and 86°F): every 3 months,
  - Storage temperature within -20 and +45°C (-4°F and 113°F): every month.

1.6 FCC IS Interference Statements

1kVA MODEL

Federal Communications Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: To assure continued compliance, use only shielded interface cables when connecting to computer or peripheral devices. Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

1.5kVA, 2kVA and 3kVA MODELS

Federal Communications Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at their own expense.

FCC Caution: To assure continued compliance, use only shielded interface cables when connecting to computer or peripheral devices. Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

2 - Installation

2.1 Package contents

The packing box contains an ***ACE Plus Series UPS system***, an RS232 data cable, a CD ROM and this manual. Carefully inspect the packing box and its contents. If any damage is visible please immediately notify the carrier and/or dealer.

2.2 Location

Please refer to section 1.3 of 'IMPORTANT SAFETY INSTRUCTIONS'

2.3 Rear panel

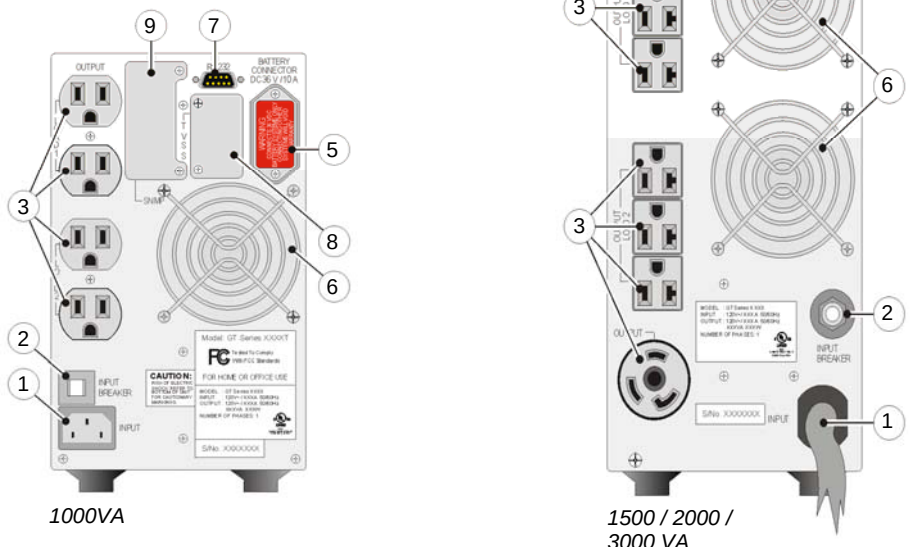


Fig. 2.1 Rear panels

1 ***Input***
AC utility supply power to the UPS

2 ***Input breaker***
Protects the UPS from damage caused by high input currents

3 ***Output receptacles***
To connect critical load to the UPS

4 ***Output circuit breaker***
Protects the UPS from damage caused by output overload

5 ***DC connector***
To connect external battery pack for extended runtime

6 ***Fan***
Electronically controlled cooling fan. Make sure ventilation air can move freely around and trough the UPS

7 ***Communication interface***
RS232/dry contact. Allows communication between computer and UPS. See chapter 4 for more detailed information.

8 ***TVSS*** - **T**ransient **V**oltage **S**urge **S**uppressor (RJ-45/RJ-11): To prevent damage caused by surges, noise and spikes traveling over the telephone or network line. (Optional)

9 ***SNMP Slot***
An (optional) SNMP adapter can be plugged into this port for managing the UPS via the network. See chapter 4 for more detailed information.

2.4 Installation

The unit should be installed by service personnel.

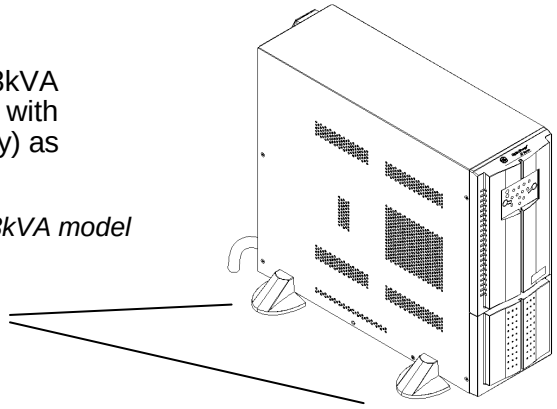
IMPORTANT:
Before making any connection and switching on the UPS, please check the following conditions:

- your mains supply is 100/110/120 Volts and 50/60Hz,
- the total power demand of the connected equipment does not exceed the rated output power of the UPS (indicated on the rating label).

2.4.1 Stable placing of 1.5kVA-3kVA model

To secure a stable placing of the 2-3kVA models it is advised to set up the UPS with supporting stands (not included in delivery) as shown in fig 2.2.

Fig. 2.2 Set up of 2-3kVA model



2.4.2 Connecting an external battery pack

1. Before installation, check whether the nominal voltage of battery pack is suitable for the UPS. The voltages mentioned on the battery connectors should match.
2. Utilize the battery connection cable that came with the battery pack to connect the battery pack to the UPS as shown in fig. 2.5. The other connector of the battery pack can be used to connect a second, third etc. pack.

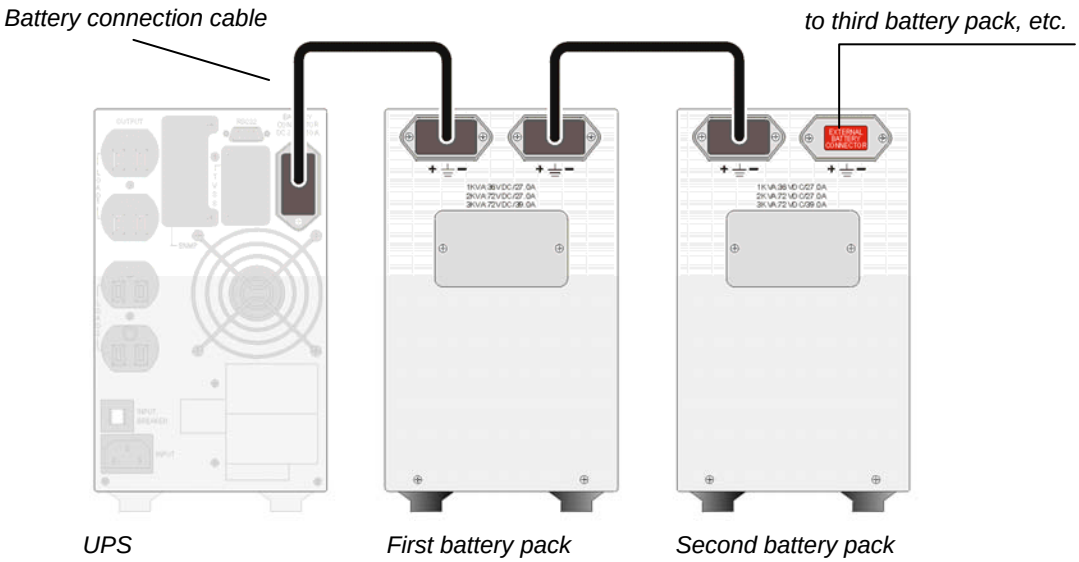


Fig. 2.3 Connecting external battery pack(s) to the UPS
(figure shows 1000VA UPS model)

UL 1778 safety requirement:
In order to allow quick removal of the battery power cord in case of emergency, just plug in the battery power cord; do not fix the connector with screws.

2.4.3 Connecting the RS232/dry contact interface

Connect the interface signal cable between the RS-232/dry contact port on the rear panel of UPS and COM1 or COM2 of your computer if necessary. See fig. 2.4.
Refer to chapter 4 for more information.

2.4.4 Connecting the load

1. Calculate the total power consumption of your loads to ensure that the UPS is able to supply the required power and overload condition will not happen.
2. Plug the power cord of the equipment into the output receptacles on the rear panel of the UPS as shown in fig. 2.4. Spread the load over the output receptacles as equally as possible.

CAUTION: Do not connect a laser printer to the UPS.

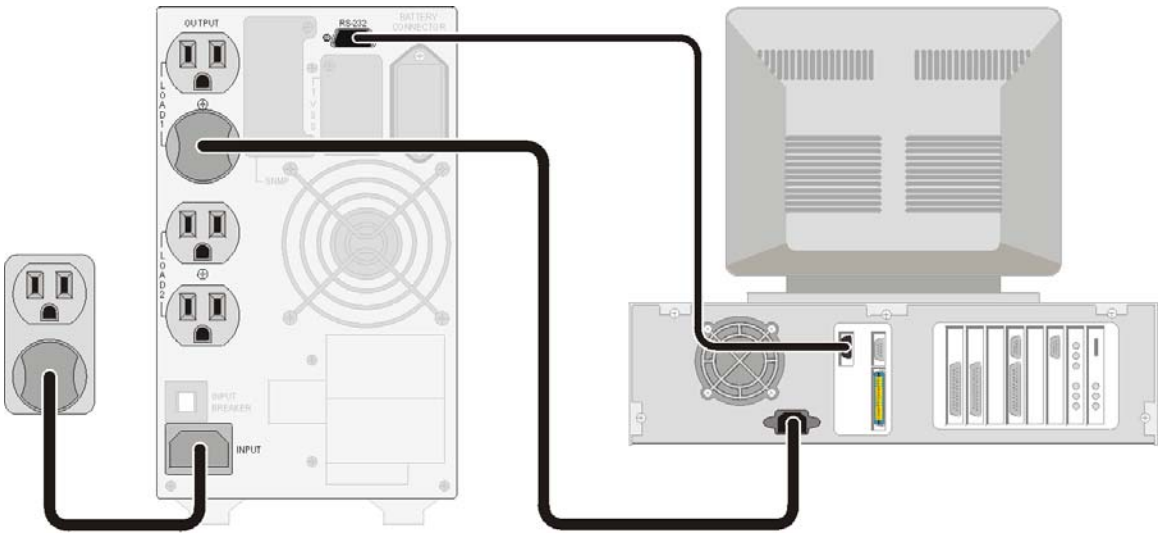


Fig. 2.4 Connecting the UPS to the utility supply and to the load (figure shows 1000VA UPS model)

2.4.5 Connecting to the utility power supply

1000VA:
Use a suitable power cord, and plug it into the input socket (see fig. 2.4)
1500/2000/3000VA:
The UPS is equipped with a fixed input power cord.

1. Plug the input power cord into a working three wire, grounded AC wall outlet. Do not use extension cords.

2. Turn on the input breaker (if the breaker can be turned on) on the rear panel of UPS. After that, the fan (in rear panel) will run and, as a front panel test, all LEDs will light up for about 2-3 seconds. The UPS starts up in 'STAND-BY' mode and the battery will be charged. See fig 2.5.

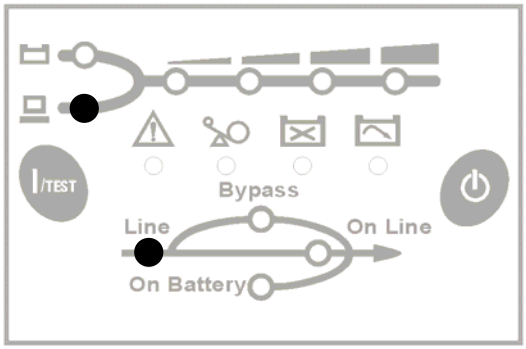


Fig. 2.5 Stand-by mode

Though the batteries (the internal energy reserve) were fully charged when the UPS left the factory, they might have lost some energy during transport and/or storage. It is recommended to allow the UPS to recharge the batteries for at least 6 hours. This way you ensure that the UPS can provide sufficient runtime in case of a utility power failure.

2.4.6 Checking the site wiring fault LED

When the UPS is still in 'STAND-BY' mode, check the site-wiring fault LED. If the UPS is plugged into an improperly wired AC utility power outlet, this LED flashes as shown in Fig 2.6.

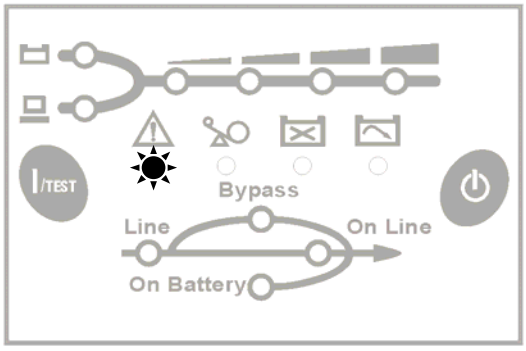


Fig. 2.6 Site wiring fault

The detection of site wiring faults includes a missing ground, phase-neutral polarity reversal and an overloaded neutral circuit. If the LED flashes, unplug the UPS and have the site wiring checked by a qualified electrician.

This step completes the installation procedure.

3 - Operation

3.1 Operation Panel

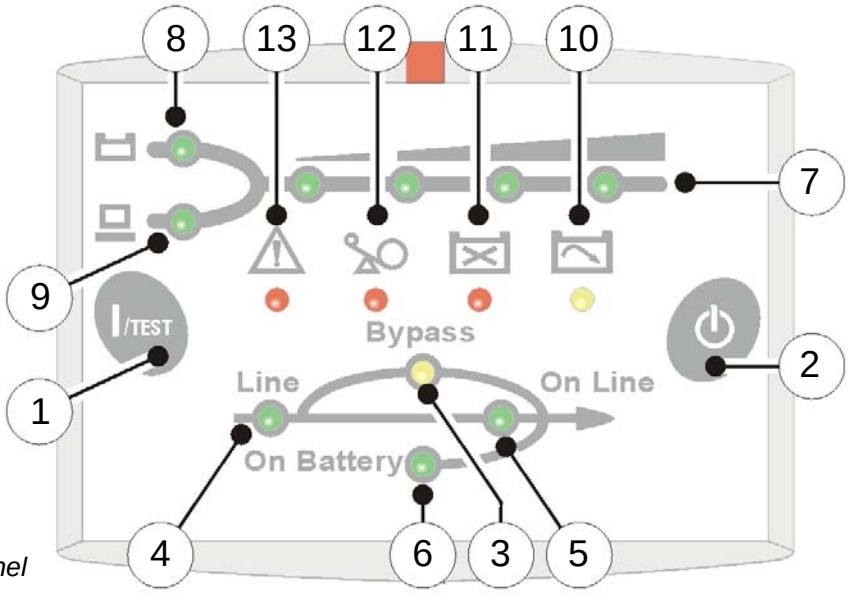


Fig. 3.1 Operating panel

1	***Switch 'I/TEST'***	- Switches on the UPS - In 'ON-LINE' mode it starts the battery test - In 'ON BATTERY' mode it mutes the buzzer
2	***Off switch***	Switches off the UPS
3	***LED 'Bypass'***	The UPS is in 'BYPASS' mode: the incoming utility power is channeled directly to the load. See also 3.3.5
4	***LED 'Line'***	Indicates the condition of the utility input power. *Continuously* lighting up: the input power is OK, *Flashing*: input voltage is too low, too high, or out of frequency, *Off*: blackout or ultra high voltage (>150Vac)
5	***LED 'On Line'***	The UPS is operating in the (normal) 'ON LINE' mode
6	***LED 'On Battery'***	The UPS is operating in 'ON BATTERY' (back-up) mode: utility power fails, and the internal batteries supply the required power until either they are depleted or utility power returns.
7	***Level bar***	- In 'ON BATTERY' mode: shows current battery capacity - In 'ON LINE' mode: showing current load level
8	***Battery LED***	Level bar shows current battery capacity
9	***Load LED***	Level bar shows current load level
10	***Battery low LED***	The battery is almost depleted
11	***Replace battery LED***	After a battery test the LED shows that the batteries are weak. Battery replacement is recommended
12	***Overload LED***	The load exceeds the nominal UPS rating. After a short period of time the UPS will transfer to 'BYPASS' mode
13	***Fault LED***	The UPS is faulty

3.2 Start-up

3.2.1 Start-up, utility power available

1 Push the 'I/TEST'-button (1) and hold for 3 seconds until a short beep is heard. The bypass LED will shortly light up. When the LED 'On Line' lights up, the UPS is running in 'ON LINE' mode.
2 The equipment connected to the UPS can now be switched on.

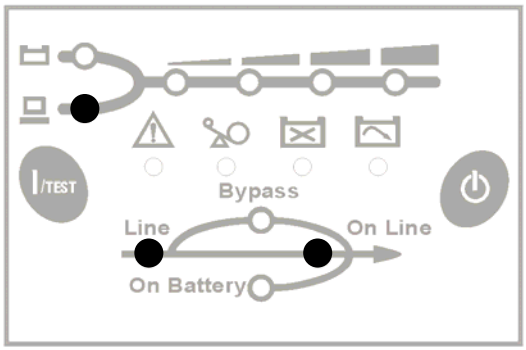


Fig. 3.2 On Line mode

3.2.2 Start-up, utility power not available (cold start or battery start)

1 Push the 'I/TEST'-button (1) and hold for 3 seconds until a short beep is heard. The battery LED and LED 'On Battery' will light up. The UPS operates in 'ON BATTERY' mode": it discharges the batteries.

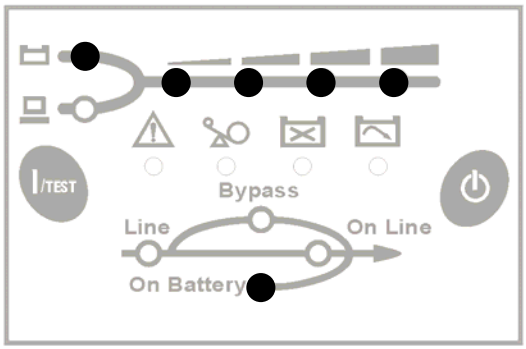


Fig. 3.3 On Battery mode

3.3 Use: Normal Operation

3.3.1 Normal operation conditions:

- the utility power supply is present and within allowable tolerances,
- the load does not exceed the nominal rating of the UPS and
- the operating temperature is below alarm level
- the UPS is on,

3.3.2 Normal operation indications:

- LEDs 'Line', 'On Line' and the Load LED are on
- One or more LEDs on the level bar are on
- the buzzer is silent

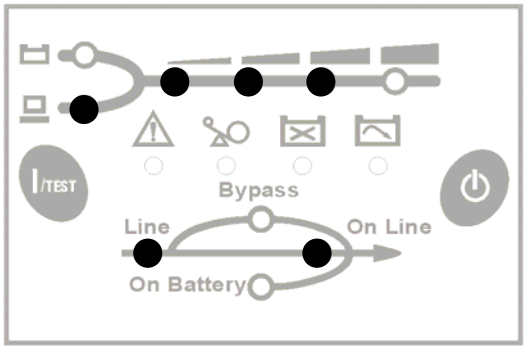


Fig. 3.4 Normal operation

3.3.3 UPS self-test

Press the 'I/TEST'-button (1) when the UPS is in 'ON LINE' mode. The UPS will shift to 'ON BATTERY' mode and automatically perform a self-test for about 10 seconds (as in fig. 3.5). The self-test function will check the condition of the battery. After self-test is finished and test is O.K, the UPS will return to 'ON LINE' mode.

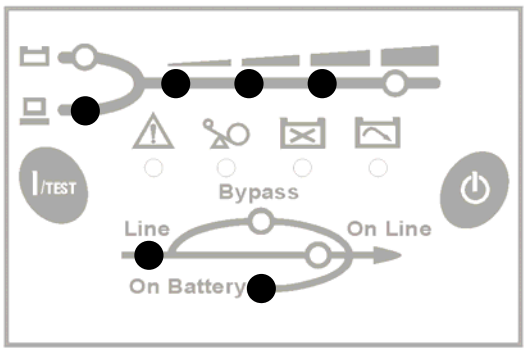


Fig. 3.5 UPS self test

3.3.4 Silencing the buzzer

When the UPS is in 'ON BATTERY' mode the buzzer can be turned on or off by pressing the 'I/TEST'-button (1).

3.3.5 Switching off

1 To switch off the UPS push the OFF-button (2) until a short beep is heard. Release the button after the beep. After a few seconds the UPS will be in 'STANDBY' mode: it will continue keeping the batteries charged. See also fig. 2.5.
2 To fully turn off the UPS, and/or if electric isolation is required, unplug the power cord of the UPS from the wall outlet.

3.4 Use: Abnormal Conditions

3.4.1 On battery

In case of a utility power failure the UPS will use the energy stored in the battery to supply the load.
The LED 'On Battery' will light and the buzzer beeps with a 2 seconds interval.
When the utility power returns, the UPS will switch back to normal operation. In case of a long power failure the UPS will stop operating when the batteries have been depleted (see Chapter 8 - Battery - Back-up Time).

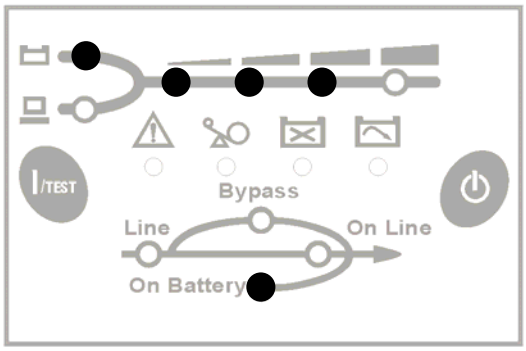


Fig. 3.6 On battery

3.4.2 Battery low

The batteries are nearly discharged during battery operation (see 3.4.1).
The LED 'On Battery' and the 'Battery Low' LED will light and the buzzer beeps with a 1.5 seconds interval, Controlled shutdown of any computer equipment is absolutely necessary at this point

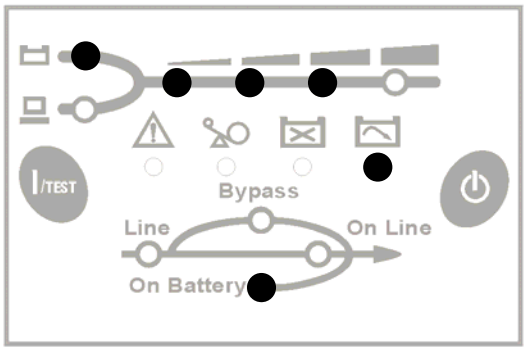


Fig. 3.7 Battery low

3.4.3 Overload

The demanded power exceeds the normal capacity of the UPS.
The Overload LED will light and the buzzer sounds continuously.
You are advised to unplug some load as soon as possible. If an overload condition persists, the UPS may eventually switch to bypass operation. If this is not possible (UPS was operating on battery during utility failure, bypass is not available) the UPS output power may be lost.

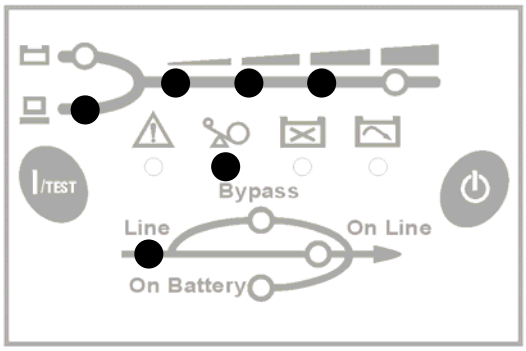


Fig. 3.8 Overload

3.4.4 Bypass operation

If the UPS is unable to deliver the demanded output power due to overload or over-temperature, the load is switched directly to the utility supply.
The LED 'Bypass' will light, and the buzzer will sound continuously.
The UPS will switch back to 'ON LINE' mode (normal operation) when the load and/or temperature conditions returned to normal.

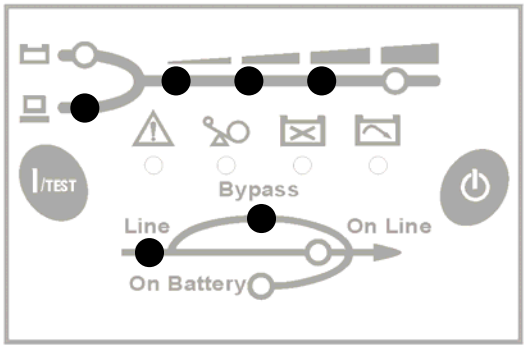


Fig. 3.9 Bypass operation

If a power failure occurs during bypass operation, the UPS will switch to battery operation and eventually, when the batteries are depleted, UPS output power is lost. If the UPS functions under overload or over-temperature conditions it may not be able to protect the load.

3.4.5 Replace battery

The batteries are aged and must be replaced as soon as possible to ensure full protection for your equipment.
The 'Replace Battery' LED lights and the buzzer sends out three beeps every hour, until the batteries have been replaced.

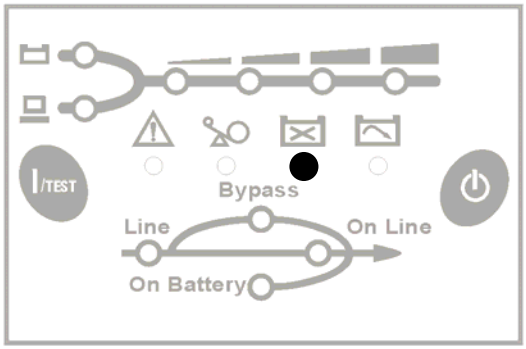


Fig. 3.10 Replace battery

3.4.6 Short circuit

In case of a short circuit in the load during 'ON-LINE' mode or 'ON BATTERY' mode the UPS will shut down and output power is lost.
The Fault LED will light and the buzzer will sound continuously.
The situation will be cleared if the short circuit is removed.
If the short circuit situation happens during 'BYPASS' mode, the input breaker will trip and the UPS output power is lost.

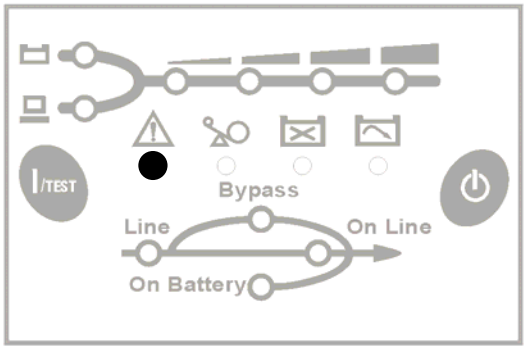


Fig. 3.11 Short circuit

4 - Communication

4.1 Description

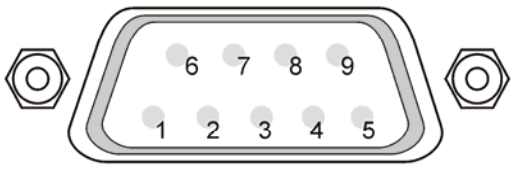
The **ACE Plus Series UPS** is equipped with a communications interface, providing RS232 and dry contact protocols in one sub-D 9-pin female connector located at the rear of the unit. The communication port on the UPS can be connected to a computer. This port allows the computer to monitor the UPS status and control the operation of the UPS in some conditions. Using proper UPS management software and cable, the UPS can be managed in LAN/intranet/internet environments.
Some computers may have a special connector to link this communication port, or require a special plug-in card, or need special UPS monitoring software. For specific information on ***ACE Plus Series*** connectivity products please contact your local dealer or Internet:

http://www.powervar.com

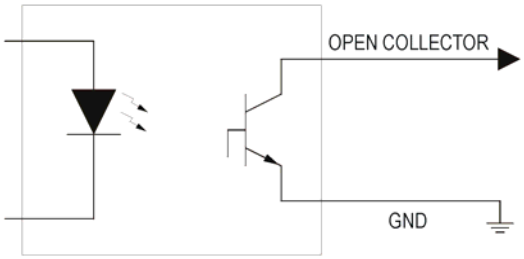
The dry contacts (4.3) and (optional) SNMP plug-in card (4.4) can be connected at the same time. However, if both are operating simultaneously the remote shutdown facility for the dry contacts will not be available. Battery low and AC failure functions remain unaffected.

The pin assignment of the interface connector is defined as follows:

PIN	ASSIGNMENT DESCRIPTION	
	RS-232	Dry Contact
1		Low battery (Open collector)
2	UPS TxD (typical RS-232 level)	
3	UPS RxD (typical RS-232 level)	Remote shutdown (5~12V)
4	Reserved for PNP	
5	GND	GND
6	Reserved for PNP	Reserved
7	Reserved for PNP	Reserved
8		Utility Fail (Open collector)
9		



Pin Assignment



Open Collector Circuit

The maximum voltage and current on pin 1,8 is 30VDC, 10mA.

4.2 RS232

The ***RS-232 communication port*** provides the following functions:

1 - Monitoring charger status
2 - Monitoring battery status and condition
3 - Monitoring inverter status
4 - Monitoring UPS status
5 - Monitoring the AC utility power status
6 - Turn on/off UPS on schedule for power saving
7 - Adjust transfer voltage

Pin Assignment:

Pin 2	:	PC receives line RS-232 data from UPS.
Pin 3	:	PC transmits line RS-232 data to UPS.
Pin 5	:	Signal ground.
Pin 4,6,7	:	Reserved for plug and play function.

The UPS data is provided at 2400 bps baud rate and made up of 8-bit, 1 stop-bit and no parity bit. All information is encoded in ASCII format.

Hardware:

Baud rate	2400 bps
Data length	8 bits
Stop bit	1 bit
Parity	none

Cabling:

Standard sub-D 9 cable (UPS side: male, PC side: female)

4.3 Dry Contact

Its major functions are some or all of the following:

1 - to broadcast a warning when the AC utility power fails.
2 - to save open files before the battery is exhausted.
3 - to turn off the UPS via computer(s).

Pin Assignment:

Pin 1	:	Normally open. When the battery voltage level is low, pin 1 and pin 5 are connected together via a photo coupler.
Pin 3	:	UPS will shut down when a high level (5~12V) is applied for at least 3.8 seconds.
Pin 5	:	Signal ground.
Pin 6,7	:	Reserved.
Pin 8	:	Normally open. When the AC utility fails, pin 8 and pin 5 are connected together via a photo coupler.

Cabling:

A special cable must be used with a pin assignment as follows:

PC (female)	**UPS (male)**
Pin 1 ----------	Pin 1 (Battery Low)
Pin 3 ----------	Pin 5 (GND)
Pin 4 ----------	Pin 3 (Shutdown)
Pin 7 ----------	Pin 6
Pin 7 ----------	Pin 7
Pin 8 ----------	Pin 8 (AC Fail)

4.4 SNMP Plug-in Card (optional)

SNMP (Simple Network Management Protocol) is the most popular protocol in the network. Via NMS (Network Management Station) you can detect the status of all facilities in the network.

An SNMP Interface Card can be plugged into the built-in SNMP slot on rear panel of the UPS (please refer to fig. 2-1). This optional interface unit can integrate the UPS into the network allowing you to easily monitor the UPS status.
NOTE: Once you install the SNMP card in the UPS, you cannot get any information from the UPS via RS232. i.e. only either an SNMP card or the RS232 port can be used as a communication interface!

The SNMP card also supports SHTTP protocol, you can use browser Microsoft IE or Netscape Communicator to monitor or configure the UPS. Besides, the SNMP card supports Telnet and FTP for remote monitoring and firmware upgrading.

Specifications:
1 - Auto detecting 10/100M Network speed.
2 - Supporting protocol: TCP/IP, UDP, HTTP, ICMP, ARP, TELNET, BOOTP, DHCP, FTP and SNMPv1.
3 - Remote firmware upgradeable and configurable.
4 - Web server built-in, allow monitoring/controlling UPS via browser.
5 - VT100 terminal mode or Telnet to configure SNMP.

Functions:
1 - Schedule: Shutdown/Restart UPS, testing and control outlets.
2 - Testing: Scheduled testing of the battery can insure that the UPS will operate properly during a utility power failure.
3 - Event log: Auto-record the power event.
4 - Historical records: Keep records of UPS status in specified interval.
5 - Event handling: configure special action for each power event to meet your requirements.
6 - On/Off UPS: set-up the power on/off timer.
7 - Outlet control: configure UPS outlets.

5 - Optional Features

Apart from the SNMP-option described in 4.4 the following options are possible:

5.1 Extended Runtime

Extended runtime can be obtained by connecting a separate battery extension module to the UPS. The additional batteries increase the runtime and recharging time for the unit, all other operational information is the same as for standard models.

5.2 TVSS (Transient Voltage Surge Suppressor)

RJ-45/RJ-11 Surge Protector.
To prevent damage caused by surges, noise and spikes traveling over the telephone line or network line.

6 - Maintenance

6.1 General Maintenance

Apart from battery servicing, the UPS is virtually maintenance free. Take care of proper environmental conditions and keep air inlets/outlets free of dust. Please read 1.3.

6.2 Batteries - General

The service life of the battery is from 2 to 6 years, depending on the operating conditions (mainly temperature and number of discharge cycles).
As a healthy battery is critical to the performance of the UPS, it is advised to regularly perform a battery test to ensure failsafe operation (see section 3.3.3). When the condition of the battery is critical, a *'replace battery'* alarm will be activated (see 3.4.5). Have the batteries replaced as soon as possible. See 6.3.

6.3 Batteries - Replacement

- **WARNING:** first read the safety rules in sections 1.1, 1.2 and 1.4.
- Servicing of batteries should be performed or supervised by personnel knowledgeable of batteries and the required precautions. Keep unauthorized personnel away from batteries.

6.4 Recycling the UPS at the end of service life

POWERVAR, in compliance with environment protection recommends that the UPS equipment, at the end of its service life, must be recycled conforming to the local applicable regulations.

7 - Troubleshooting

Whenever a malfunction occurs, first check external factors (e.g. connections, temperature, humidity or load) to determine whether the problem is caused by the unit itself or by its environment. Subsequently check the thermal circuit breaker: it may be tripped. If so: reset it and be sure that the UPS is not overloaded.
The following chart is a simple troubleshooting checklist only. If the suggested solution does not succeed, or if the information is insufficient to solve the problem, please contact your dealer or consult http://www.powervar.com.

PROBLEM	POSSIBLE CAUSE	SOLUTION
Input Circuit Breaker tripped	UPS overload	Reduce load, reset breaker
	System failure	Contact your dealer or consult www.gedigitalenergy.com
UPS will not switch on	Line cord not connected	Connect line cord
	Dead wall socket outlet, or mains voltage out of limits	Contact qualified electrician
	Tripped input circuit breaker	Check whether UPS is not overloaded, reset breaker
	Battery voltage too low	Allow UPS to recharge the battery
	Batteries not connected	Contact your dealer or consult www.gedigitalenergy.com
UPS has no output	UPS over-temperature	Allow UPS to cool down
	Utility failure, battery depleted	Wait until utility power returns
	Input breaker tripped	See above
LED 'Fault' lights up, buzzer sounds continuously	Internal UPS failure	Contact your dealer or consult www.gedigitalenergy.com
LED 'Fault' flashes	Wiring fault (L-N reversed)	Have site wiring checked by qualified electrician
LED 'Battery low' lights up, buzzer beeps 2x/sec.	Battery is close to being exhausted during utility failure	The UPS output will be lost soon. Shut down the load in an orderly manner
LED 'Replace battery' lights up, buzzer sounds continuously	Battery test just after a utility failure ('false alarm')	Allow the UPS to recharge the battery for approx. 8 hours, then repeat the battery test
	Battery is close to being worn out	Allow the UPS to recharge the battery for approx. 8 hours, then perform battery test. If the alarm persists, consider battery replacement
LED 'Overload' lights up, buzzer sounds continuously	UPS is overloaded	Reduce load, e.g. by unplugging non-critical load
Buzzer sounds continuously: over-temperature	Ambient temp. too high, or ventilation blocked	Reduce ambient temperature, enhance ventilation
	Fan failure	Have the fan replaced
UPS cannot be linked to computer	Communication cable defective	Check cable
	Transmitting rate fault	Adjust transmitting rate
	Communication port fault	Check COM1/COM2 configuration of the computer

8 - Specifications

ACE Plus		ACDEF 1000T	1500T & 2000T	ACDEF3000T
Capacity		1kVA/800W	1.5kVA/ 1200 W 2kVA/1600W	3kVA/2400W
Input	Rated Voltage	100V, 110V, 120V		
	Voltage Range	80V~138V (full load); 65V~80V (70% load)		
	Frequency	50Hz / 60Hz (± 4.8 Hz)		
	Power Factor	≥0.97		
Output	Voltage	100V, 110V, 120V		
	Frequency	50Hz / 60Hz		
	Voltage Regulation	± 2%		
	Frequency Accuracy	± 0.05 Hz		
	Wave Form	pure sine wave		
	Transient Response	± 8% (10%~90% linear load)		
	THD (linear load)	≤3%	≤3%	≤4%
	THD (computer load)	≤6%		
	Overload Capacity	105%~125% for 3mins; 125%~150% for 30secs; >150% for 1sec		
	Crest Factor	3:1		
	Efficiency (AC-AC)	≥ 87%		
Outlet	Receptacles	NEMA TYPE		
Battery	Battery Voltage	36V	72V	72V
	Battery Type (Lead acid)	12V/7Ah	12V/7Ah	12V/9Ah
	Back-up Time (Typical)	6mins	10mins	5mins / 5mins
	Recharge Time	4~6 hours after complete discharge to recover 90%		
Transfer Time	Transfer Time	zero		
LED	LED Status	On-line / Bypass / On-battery / Overload / Battery Low / Fault Battery Replace / Battery Level / Load Level		
	Alarm	buzzer		
Interface	DB9	RS232/dry contact		
	SNMP Slot	internal		
Environment	Noise (At 1 Meter)	40dB(A)	42dB(A)	42dB(A)
	Operating Temperature	0~40°C (32~104°F)		
	Humidity	0%~90% (non-condensing)		
Safety Approval	Safety	UL/cUL, RoHS		
	EMC	FCC Class A (2, 3kVA) /B (1kVA) CISPR PUB 22 Class B; TUV/EMC; CE (1kVA) CISPR PUB 22 Class A (2, 3kVA)		
	Lightning	IEEE 62.41 Category A		
Others	Battery Start	yes		
	Extended Battery Bank	yes (optional for longer runtime)		
	Long Time Model	yes (optional)		
Appearance	Dimensions (HxWxD)	241x140x366 mm 9.5x5.5x16.7 inch	373x140x424 mm 14.7x5.5x16.7 inch	
	Weight	15 kg 33 lbs	30 kg 66 lbs	30 kg 66 lbs